

In the claims:

Please amend claims 9, 39-41 and 43.

Please add new claim 46.

1-5. **(Canceled)**

6. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein the kallikrein is hK2 kallikrein.

7. **(Canceled)**

8. **(Canceled)**

9. **(Currently amended)** The recombinant inhibitor protein of claim 39 8, wherein the serpin sequence is selected from the group consisting of α -1 antichymotrypsin (ACT), protein C inhibitor (PCI), α -1 antiproteinase (AAT), human α -1 antitrypsin-related protein precursor (ATR), α -2-plasmin inhibitor (AAP), human anti-thrombin-III precursor (ATIII), protease inhibitor 10 (PI10), human collagen-binding protein 2 precursor (CBP2), protease inhibitor 7 (PI7), protease inhibitor leuserpin 2 (HLS2), human plasma protease C1 inhibitor (C1 INH), monocyte/neutrophil elastase inhibitor (M/NEI), plasminogen activator inhibitor-3 (PAI3), protease inhibitor 4 (PI4), protease inhibitor 5 (PI5), protease inhibitor 12 (PI12), human plasminogen activator inhibitor-1 precursor endothelial (PAI-1), human plasminogen activator inhibitor-2 placental (PAI2), human pigment epithelium-derived factor precursor (PEDF), protease inhibitor 6 (PI6), protease inhibitor 8 (PI8), protease inhibitor 9 (PI9), human squamous cell carcinoma antigen 1 (SCCA-1), human squamous cell carcinoma antigen 2 (SCCA-2), T4-binding globulin (TBG), Megsin, and protease inhibitor 14 (PI14). ~~fragments thereof, molecular chimeras thereof, combinations thereof, and variants thereof.~~

10. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein said recombinant inhibitor protein is selected from the group consisting of MD820, MD 62, MD 61, MD 67, and MDCI.

11. **(Canceled)**
12. **(Previously presented)** An isolated DNA sequence encoding the recombinant inhibitor protein of claim 39.
13. **(Previously presented)** The isolated DNA sequence of claim 12, wherein said sequence is selected from the group consisting of SEQ ID N° 1, SEQ ID N° 3, SEQ ID N° 5, SEQ ID N° 7, SEQ ID N° 9, SEQ ID N° 11, and SEQ ID N° 13.
14. **(Previously presented)** An expression vector comprising the isolated DNA sequence of claim 12.
15. **(Previously presented)** The expression vector of claim 14, further comprising a promoter operably linked to the isolated DNA sequence.
16. **(Previously presented)** A eukaryotic or prokaryotic host cell transfected with the expression vector of claim 14.
17. **(Previously presented)** A pharmaceutical composition comprising the recombinant inhibitor protein of claim 39 and a pharmaceutically acceptable carriers.
18. **(Original)** A method of treating or preventing a proteolysis-associated disorder in a mammal comprising administering to said mammal the pharmaceutical composition of claim 17.
19. **(Previously presented)** The method of claim 18, wherein the disorder is a disorder in which hK2 kallikrein activity is detrimental.
20. **(Previously presented)** The method of claim 19, wherein the disorder is selected from the group consisting of a cancer, an autoimmune disorder, an inflammatory disorder, and ~~or~~ an infectious disorder.

21. **(Previously presented)** The method of claim 20, wherein the cancer is selected from the group consisting of prostate cancer, breast cancer, and a metastatic cancer.

22. **(Previously presented)** The method of claim 20, wherein the inflammatory disorder is Benign Prostatic Hypertrophy.

23-27. **(Canceled)**

28. **(Previously presented)** A method for producing the recombinant inhibitor protein of claim 39, comprising

- a) selecting a polynucleotidic sequence encoding a substrate active site specific for said Kallikrein;
- b) introducing said polynucleotidic sequence into a sequence encoding a serpin, so as to obtain a recombinant inhibitor protein;
- c) allowing expression of said recombinant inhibitor protein in a cell expression system under suitable conditions; and
- d) recovering said recombinant inhibitor protein.

29. **(Previously presented)** The method of claim 28, wherein step a) is performed by phage-displayed library screening.

30. **(Previously presented)** The method of claims 28, wherein the suitable conditions comprise culturing the cell expression system at a temperature between 10-40°C during 10-30 hours.

31. **(Previously presented)** The method of claim 30, wherein the suitable conditions comprise a temperature of 16°C during 16 hours.

32. **(Previously presented)** The method of claims 28, wherein step d) is achieved by separation after extraction of said recombinant inhibitor protein from the cell expression system.

33. **(Previously presented)** The method of claim 32, wherein the separation of said recombinant inhibitor protein is achieved by affinity chromatography.
34. **(Previously presented)** The method of claims 28, wherein the recombinant inhibitor protein is further assayed for its ability to inhibit the activity of said kallikrein.
35. **(Canceled)**
36. **(Previously presented)** The method of claim 28, wherein the cell expression system is a bacterial cell.
37. **(Previously presented)** A diagnostic kit for the detection of a kallikrein in a specimen comprising a DNA sequence selected from the group consisting of SEQ ID N° 1, 3, 5, 7, 9, 11, 13, a sequence complementary thereof, fragments thereof, and variants thereof.
38. **(Previously presented)** A diagnostic kit for the detection of a kallikrein in a specimen comprising the recombinant inhibitor protein of claim 39.
39. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, of specific for a kallikrein, comprising a serpin sequence comprising a wherein the modified Reactive Serpin Loop (RSL) of said serpin sequence, wherein the modified RSL is modified by at least one substrate active site sequence resulting in increased binding affinity ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof,~~ specific for said kallikrein.
40. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, of specific for a kallikrein hK2, comprising a serpin sequence comprising a wherein the modified Reactive Serpin Loop (RSL), wherein the modified RSL of said serpin sequence is modified by at least one substrate active site sequence resulting in increased binding affinity, ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof,~~ specific for said kallikrein hK2.

41. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, of specific for a kallikrein, comprising a serpin sequence comprising a modified wherein the amino acid sequence of the Reactive Serpin Loop (RSL), wherein the amino acid sequence of the modified RSL of said serpin sequence is selected from the group consisting of SEQ ID No 16, 17, 18, 19, 20, 21, and 22, ~~fragments thereof, molecular chimeras thereof, combinations thereof, and variants thereof.~~

42. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein the at least one substrate active site sequence specific for said kallikrein is a substrate peptide selected by said kallikrein using a phage-displayed random pentapeptide library.

43. **(Currently amended)** A ~~ehimerie~~ recombinant inhibitor protein, or an inhibiting fragment thereof, of specific for a kallikrein, comprising a serpin sequence comprising a modified wherein, the Reactive Serpin Loop (RSL), wherein a P6 – P6' region of the RSL of said serpin sequence is modified by at least one substrate active site sequence. ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof, specific for said kallikrein.~~

44. **(Previously presented)** A purified and isolated DNA sequence encoding the recombinant inhibitor protein of claim 39.

45. **(Previously presented)** A purified and isolated DNA sequence encoding the chimeric inhibitor protein of claim 43.

46. **(New)** The recombinant inhibitor protein of claim 43, wherein a P3-P3' region of the RSL is modified by at least one substrate active site sequence.